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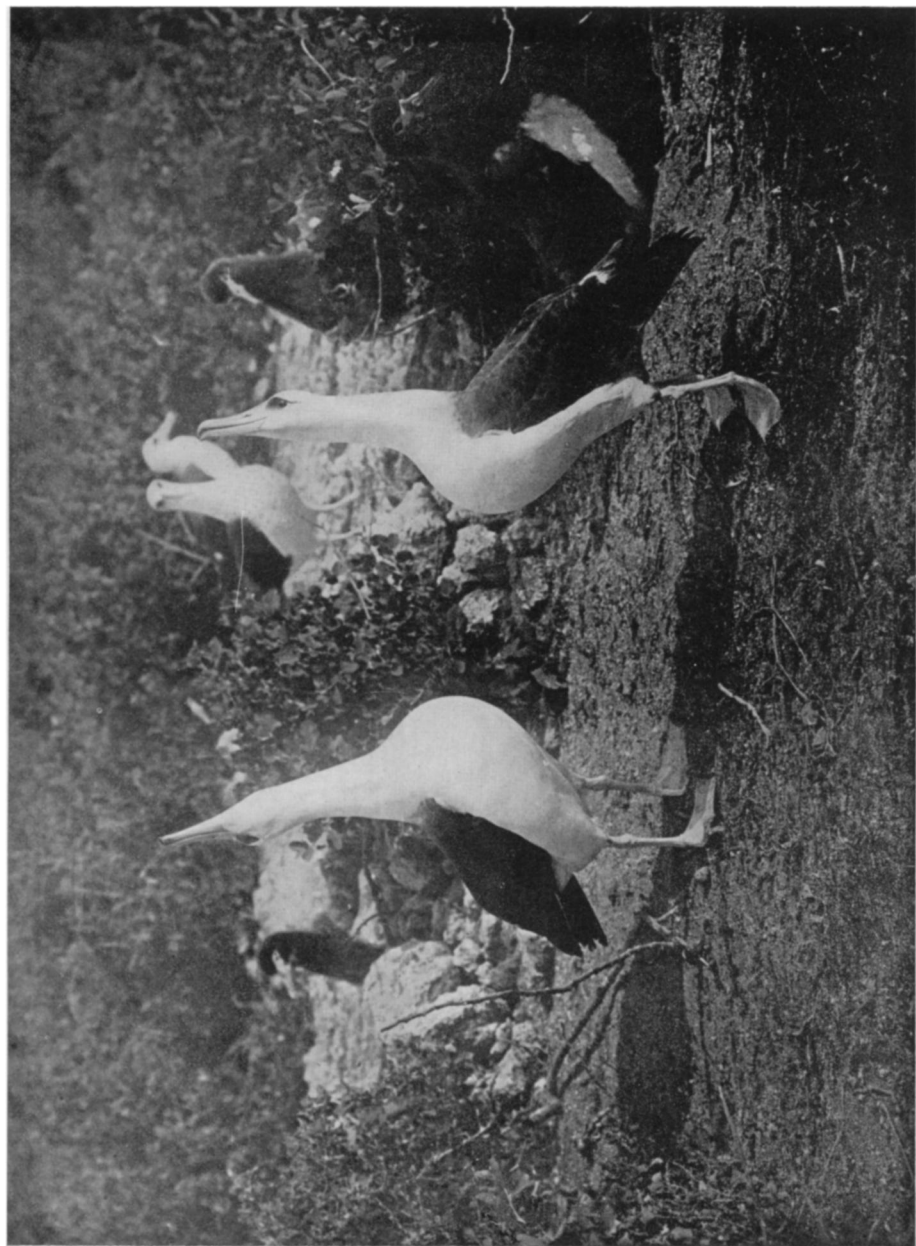
ON THE HABITS OF THE LAYSAN ALBATROSS.

BY WALTER K. FISHER, STANFORD UNIVERSITY, CALIFORNIA.

Plates II-VII.

THE magic name of Laysan¹ will ever bring to my mind the picture of innumerable Albatrosses thickly scattered in reposeful attitudes over a broad stretch of bare phosphate rock, near the southern extremity of the islet. Here in years past the indefatigable Japanese laborers had scraped a plain quite free of all the marketable phosphate rock, and had left about the borders several piles of the valuable mineral. Since then the gonies have made themselves at home, and have completely preëmpted the site. From the top of one of these hillocks I spent odd breathing moments, watching the life in this largest rookery of the island, because even the slight advantage of fifteen feet would bring much into view that before was hidden. We were agreed in calling this *the* rookery, since here in a given space were more birds than elsewhere on the island. And besides a very convenient road led to it from Mr. Schlemmer's quarters. One might ask, "Why mention the road?" The Bonin Petrels (*Æstrelata hypoleuca*) tunnel in the soft soil in countless numbers, and if one crosses the upper slopes of the island he must walk at least one half mile before gaining the solid ground near the lagoon. Nearly every other step through this area will carry him abruptly into the subterranean tunnels of these sobbing birds, and as one of our party suggested the novelty quickly wears off in the midday sunshine. So it happened we patronized the road, and our eager strolls often either ended or began near the rookery, where also there was a brackish water pond much frequented by curlews and ducks.

¹ Although the notes which form the basis of this paper have already been published in 'Birds of Laysan and the Leeward Islands, Hawaiian Group' (U. S. Fish Commission Bulletin for 1903, pp. 1 to 39, plates 1 to 10), the writer believes an account of the peculiar habits of the Albatross, with illustrative photographs, will be of interest to readers of 'The Auk.' For a short note descriptive of Laysan and its bird life the reader is referred to the October, 1903, issue of this journal, page 384. Unless otherwise stated the plates refer to *Diomedea immutabilis* Rothschild.



FINALE OF ALBATROSS DANCE — THE DUET.

The Laysan Albatross (*Diomedea immutabilis*), however, is distributed all over the island with the single exception of the sea beaches, which on all sides saving the west are colonized by the Black-footed Albatross (*D. nigripes*). The former species far outnumbers *nigripes*, and if actually not the most numerous inhabitant of the island is at any rate the most conspicuous and interesting. The Laysan Gony, or 'Gooney' as sailors pronounce it, very evidently prefers the open to the bushy area, for the flat plain surrounding the lagoon is its favorite habitat, and we found the young here in far the greatest numbers. This great colony extended all the way around the lagoon, but certain portions were more congested than others, as 'the rookery' for example, spoken of above. Young *immutabilis* were also found sprinkled rather thickly over the remainder of the island through the bushy grass area, preëmpted by petrels, and they even affected the windy slopes above the beaches. Only a very few *nigripes*, however, were detected in the central portion of the island, and these of course were widely scattered among *immutabilis*.

The rookeries present a very lively scene. At certain times of day the greater number of the adults are off to sea fishing, but there are always enough left at home to constitute about one third of the total number, the remainder being the young. If these are not disporting themselves in ridiculous attitudes, the old birds form a sufficient diversion with their endless dance and song. In Plate III, figure 1, a view is given looking over the rookery. Most of the birds here are young, the old ones being away at sea. Figure 2 is a characteristic scene on the shore of the lagoon, the picture having been taken in the afternoon when most of the old birds had returned from their morning's fishing. The dark area to the left is covered with beautiful purplish-pink flowered *Sesuvium portulacastrum*.

At the time of our visit the young were nearly four months old, and were quite as heavy as the adults, although the permanent feathering was present only on the lower parts. They were everywhere. My impression every time I crossed the petrel cities was that each great tussock of grass harbored a young Gony in its shadow, ready to dart forward and try the quality of my trousers. Mr. R. H. Beck has suggested segments of stove pipe as an effective armor in crowded bird colonies, especially as proof

against boobies, and I am inclined to agree with him. If we brushed too near the young Gonies they were quick to resent the intrusion, and flew into a rage, leaned forward and snapped their beaks rapidly in an attempt to strike terror to our hearts. Or frequently they would waddle out of their shady retreat and attack us, as it were, on our own ground, stumbling forward in wabbly efforts to reach us. Sometimes they would trip up in a petrel's hole or fall clumsily forward on their chins, and promptly disgorge their breakfast at us. Unless my observation is lacking, they always seemed to stumble preparatory to this fusillade, which once delivered left them looking very dejected indeed, as hunger is their chief trouble. Usually after the first paroxysm is over one can stroke them with little danger of scratched hands. They maintain a small fire of objection, with impotent nips, or try to sidle off. But occasionally a youngster is fully aware of his powers.

When undisturbed these absurd creatures sit for hours on their heels with their feet tilted in air, gazing stupidly ahead, with little intelligence in their stolid countenances. (Plate VI, Fig. 2.) They are peaceable as a rule, but sometimes engage in mild squabbles with youthful neighbors. The shallow basin-like hollow in which the egg is deposited is the young Albatross's home, and it usually does not stray far, except on these little forays. But later the same feeling of growing strength leads them to slowly fan their wings from time to time. During a light shower we saw a considerable colony thus engaged, the wave of motion passing far away, as new companies caught the enthusiasm. The movements were kept up for some minutes and proved a novel sight. I have seen young birds collect dried grass and similar material, which happened to be within reach, and carefully cover the hollow in which they were sitting, as if trying to form some sort of cushion.

A spirit of inquiry also sometimes leads the young Gony into trouble. We found one buried to its neck in a collapsed petrel burrow, yet still living. From the condition of the surrounding soil it was evident that the creature had been in this predicament for some time, and had been faithfully tended by its parents. Nor did it fancy being dug out, but objected most vigorously to our interest. When finally restored to a normal position, it took a



FIG. 1. ROOKERY OF LAYSAN ALBATROSS.



FIG. 2. NEAR THE LAGOON, LAYSAN.

better view of matters and began to preen its feathers. But even with these vicissitudes, and the persecution of jealous mothers of other young (to be related presently) they have few amusements to vary the monotony of the long day, for in this topsy-turvy land it is the grown-up folks who play while the young are grave and demure.

The old birds received us at once on equal terms with any feathered inhabitant of the island. They did not care a whit for our presence, and continued their domestic occupations and amusements as if we were part and parcel of the community. They would not tolerate any familiarity, however, and if we attempted to stroke their plumage they backed off with agility, unless hindered by some obstructing grass tussock, when their surprise was amusing to witness. They have a half-doubting inquisitiveness, and if we sat quietly among them, they would sooner or later walk up to examine us. (Plate IV, Fig. 2.) One bird became greatly interested in the bright aluminum top to my tripod, which it carefully examined from all sides. Finally it tested the cap with its beak, and appeared much surprised, yet pleased, with the jingling sound, repeating the experiment until satisfied.

The old birds have an innate objection to idleness, and so for their diversion they spend much time in a curious dance, or perhaps more appropriately a 'cake-walk.' This game or whatever one may wish to call it, very likely originated in past time during the courting season, but it certainly has long since lost any such significance. I believe the birds now practise these antics for the pure fun they derive, and should anyone challenge my belief that birds are capable of such a high degree of intelligence as to discriminate so finely, I would be tempted to answer: "Go to Laysan and be convinced." Let us imagine we are on the island, and can stop for a moment to watch a pair of Gonies close at hand. We will have some difficulty in choosing, for from where we are seated, among the grass, near the edge of the plain, we can easily count twenty-five couples hard at play. This is what we see.

At first two birds approach one another, bowing profoundly and stepping heavily. They swagger about each other, nodding and

courtesying solemnly, then suddenly begin to fence a little, crossing bills and whetting them together, sometimes with a whistling sound, meanwhile pecking and dropping stiff little bows. (Plate V, Fig. 1.) All at once one lifts its closed wing and nibbles at the feathers beneath, or rarely, if in a hurry, quickly turns its head. The partner during this short performance, assumes a statuesque pose, and either looks mechanically from side to side, or snaps its bill loudly a few times. (Plate V, Fig. 2.) Then the first bird (to the left of the picture) bows once, and pointing its head and beak straight upward, rises on its toes, puffs out its breast, and utters a prolonged, nasal, *Ah-h-h-h*, with a rapidly rising inflection, and with a distinctly 'anserine' and 'bovine' quality, quite difficult to describe. While this 'song' is being uttered the companion loudly and rapidly snaps its bill. (Plate VI, Fig. 1.) Often both birds raise their heads in air as shown by Plate II, and either one or both favor the appreciative audience with that ridiculous, and indescribable bovine groan. When they have finished they begin bowing to each other again, rapidly and alternately, and presently repeat the performance, the birds reversing their rôle in the game or not. In the most successful dances the movements are executed in perfect unison, and this fact much enhances the extraordinary effect. The pictures convey but a poor likeness of the actual scene; the wonderful sky and sunshine, the spotless and shining plumages, the droll cries, and most important the actual living presence of the splendid birds themselves. It is an experience never to be forgotten.

There seems to be no very hard and fast lines to these antics, but variations occur, and certain stages may be abbreviated or prolonged to suit the whim of the individual. The majority of cases, however, follows the sequence I have indicated. The attention of the reader is called to the fact that Plate V, Figs. 1 and 2, together with Plate II, form a series, taken in rapid succession, of the same pair of individuals. Plate VI, Fig. 1, representing the more usual finale of the dance, is from a pair of birds very near the above, and was taken a few moments later. The pair represented in Plate II, after their splendid exhibition, as if having knowingly done their best for me, quit entirely and walked deliberately away. It is possible that this figure represents the 'grand finale' of the whole performance, but I have only this observation



FIG. 1. A CORNER IN ONE OF THE COLONIES.



FIG. 2. AMONG THE LAYSAN ALBATROSSES.

to offer. In the numerous other cases in which I saw *both* birds 'sing,' I do not remember whether they continued thereafter or not.

It is very amusing to watch three engage in the dance, one attempting to divide its attention between two. This 'odd' bird starts by bowing to the first partner, whom he suddenly forsakes with a final deprecatory nod, and takes up the thread of the dance with the second. The latter always seems ready to join in, since he has been keeping up a sort of mark-time in the movements. Thus the single one keeps switching back and forth, trying as it were, to be on good terms with both partners at once. Three do not keep this up very long, however, since the odd bird either shows a preference for one of the partners and ignores the other entirely, or walks off to seek a new acquaintance. But throughout it all they are always exceedingly polite, and never lose their temper in any way.

Occasionally while 'cake-walking' one will lightly pick up a straw or twig, and present it to the other, who does not accept the gift, however, but thereupon returns the compliment, when straws are promptly dropped, and all hands begin bowing and walking about as if their very lives depended upon it.

Several times at this stage of affairs I have walked quietly among a group of the busy creatures, and have begun to bow very low, imitating as nearly as possible the manner of the Gonies. They would all stop and gaze at me in astonishment, but recovering their usual equanimity almost at once would gravely return my bows and walk around me in puzzled sort of way, as if wondering what kind of a bird I might be. I thought of trying this because in Rothschild's 'Avifauna of Laysan' (which we had taken with us on the steamer 'Albatross') the following extract is given from Kittlitz's notes on the birds of Laysan.

"When Herr Isenbeck met one he used to bow to it and the Albatrosses were polite enough to answer, bowing and cackling. This could easily be regarded as a fairy tale; but considering that these birds, which did not even fly away when approached, had no reason to change their customs, it seems quite natural."¹

¹ Extract from *Avifauna of Laysan, etc.*, p. iii, (F. H. v. Kittlitz in: *Museum Senckenbergianum*, I, pp. 117 et seq.)

I found that in most cases the birds would bow to me if they were interrupted in their dance, or if they had very recently been playing, but would not bow at all if accosted near their young, or when standing idle. Unusual as this trait may appear it exemplifies again what extraordinary birds Albatrosses really are.

I saw the Black-footed Albatrosses (*D. nigripes*) rather seldom engaged in the dance, and indeed they impress one as more matter-of-fact creatures. The only difference which was observed in the ceremony as carried out by the two species, is that *nigripes* spreads its wings slightly (the metacarpus or 'hand' being folded closed) when it lifts its head to utter the nasal song.

If we wander over the island on a moonlight night a strange scene greets us. Nocturnal petrels and shearwaters are wide-awake and are sobbing and yowling as if all the cats in a great city had tuned up at once. Back and forth in the weird light flutter shadowy forms, and from beneath our feet dozing young *Gonies* bite at us in protest. Down by the lagoon where the herbage is short we can see for some distance, and the ghostly forms of Albatrosses shine out on all sides, busily bowing and fencing, while the nasal sounds of revelry are borne to us from far across the placid lagoon, and we know that in other parts of the island the good work is still progressing. And so in the leisure moments of the long summer days, and far into the night, these pleasure-loving creatures seem to dance for the joy of dancing and only work because they must.

But in their hours of toil they hie themselves off to sea, and scour the waves for the elusive squid, which is a staple article of diet for the larger members of the vast bird population, the gannets, perhaps, excepted. About sunrise the main body of the white company begins to return, and for several hours they straggle in, tired but full, and seek their sleepy children, who are soon very much awake. Although the Laysan Albatrosses undoubtedly do a small part of their fishing during the day, I cannot help but feel, from the nocturnal or crepuscular habits of their food — certain cephalopods — and the prevalent feeding hours, that the major portion is done in the very early morning, perhaps from just preceding dawn till light. I noted particularly during the one day I was on the steamer, while she was dredging in the

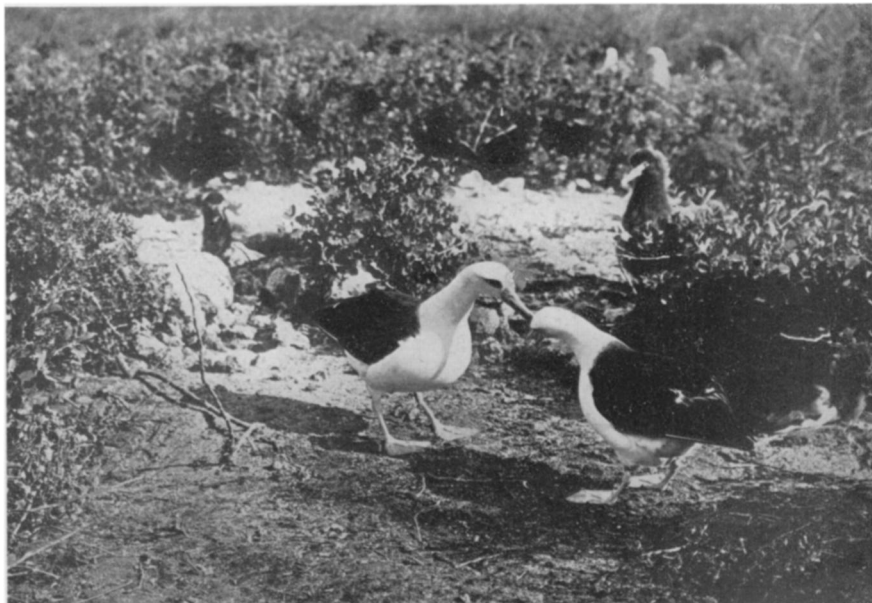


FIG. 1. FIRST STAGE IN DANCE, FENCING.

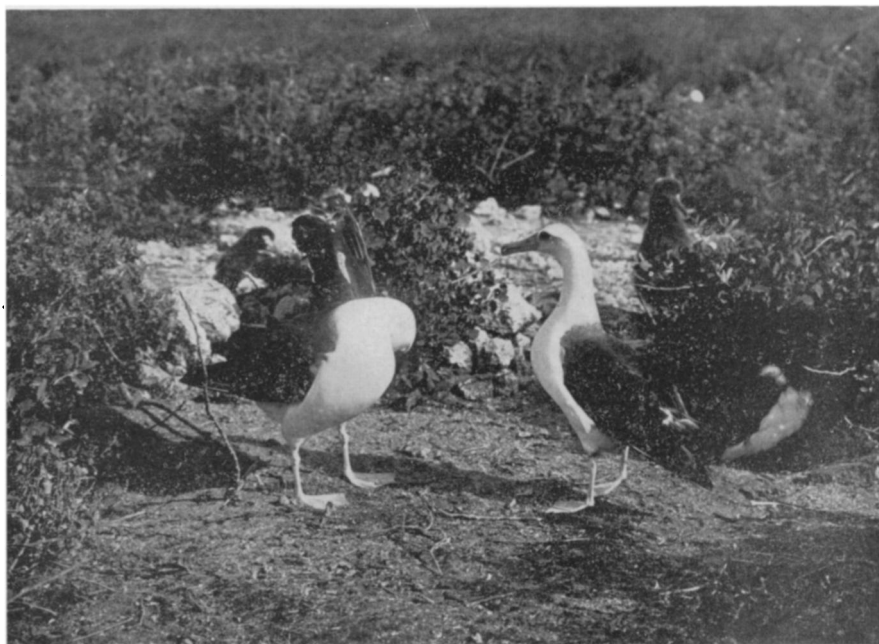


FIG. 2. SECOND STEP IN DANCE.



FIG. 1. LAST STAGE IN DANCE—ONE SINGING, THE OTHER SNAPPING BEAK.



FIG. 2. PORTRAIT OF YOUNG LAYSAN ALBATROSS.

vicinity of Laysan, that very few Laysan Gones were seen at sea after about 9 A. M. That same day we sighted the island about 5 A. M., and when I arrived on deck about 5.30 I distinctly remember seeing many of the white species (*immutabilis*) circling about the vessel. Later in the morning *immutabilis* almost entirely disappeared, but some *nigripes* remained with us all day. On the following morning we landed and I had no further opportunity to observe.

As Prof. C. C. Nutting, one of the naturalists of the expedition, has said,¹ "the most conservative estimate of the necessary food supply yields almost incredible results. Cutting Mr. Schlemmer's estimate [of the total number of albatrosses on the island] in two, there would be 1,000,000 birds, and allowing only half a pound a day for each, surely a minimum for these large, rapidly growing, birds they would consume no less than 250 tons daily." From rather extended observations on the feeding habits I would place the quantity fed each young bird every morning at nearer one or one and a half pounds of squid (*Ommastrephes oualaniensis* Less., *O. sloanei* Gray, and *Onychoteuthis banksi* Fér.²). I believe Prof. Nutting's estimate of a million birds is not too great. Thus in one day the Albatrosses alone would consume nearer 600 tons of squid. Think of the amount all the shearwaters must consume, and the tons of fish, large and small, eaten by boobies, frigate birds, noddies, terns, and tropic birds!

As indicated above, breakfast may be ready almost anytime during the early forenoon, for the mother does not invariably feed the baby immediately on returning. However, when all is ready she alights near the impatient and greedy child, who immediately takes the initiative by waddling up and pecking or biting gently at her beak. (Plate VII, Fig. 1.) This petitioning always takes place, and acts perhaps as some sort of stimulus, for in a few moments she stands up, and with head lowered and wings held loosely at the sides (Plate VII, Fig. 2) regurgitates a bolus of squids and oil. Just as she opens her beak, the young one who has been standing ready, inserts its own crosswise, and skilfully catches every morsel, which it bolts with evident relish. (Plate

¹ Popular Science Monthly, Aug., 1903, p. 324.

² Schauinsland: Drei Monate auf einer Koralleninsel, p. 92.

VIII, Fig. 1). After the process is repeated at intervals of a few minutes, some eight or ten times, the meal is over. The last two or three ejections of this oily pabulum cost the Albatross considerable muscular effort, and the last time nothing came but a little oil and stomach juices. As Prof. Nutting aptly expressed it, "she pumped herself quite dry." The attention of the reader is again called to the fact that this series of three pictures, illustrating the process of feeding, is taken from the same pair of birds.

This domestic duty was one of the common morning sights on the island, and we had not been ashore but a few moments before we witnessed it close to the lighthouse. The mother bird seemed to take quite kindly to the circle of interested men, and fed her offspring, as if it were the most natural thing in the world to have an audience. In fact, I may mention in this connection that the Albatrosses nest all around Mr. Schlemmer's door yard, and from a little distance appear like unwieldy goslings before the door-step. The petrels, also, burrow in front of the house, but of course are not evident in the daytime; and if one strolls out in the wonderfully soft tropical moonlight, he can see the little fiddler crabs scuttling here and there, resuming the work of 'autographing' the white coral sand where the numerous finches, honey-eaters, and rails have left off at sundown. Through the night the island is nearly as lively as at sunrise.

After the Albatross has finished feeding, the young bird is not at all backward in asking for more, but keeps on petitioning and working its head back and forth as if suggesting to its mother a further means of obtaining food. The old one now pecks back in an annoyed manner, and if the baby still urges, she rises from her sitting posture and walks off, usually to vent her morning ill humor on some neighboring young. Often I have seen her dash over to an inoffensive and unprotected 'Gonylet,' and give it a most undeserved trouncing, mauling and 'wooling' it in a pitiful manner. The unfortunate thing never knows what to do, so it tries to peck back, but is soon worsted, and cries in a plaintive squeak for relief. After a while the ill-natured creature returns to its own exacting offspring, sometimes to feed it again, or only to start off for another strange baby. Although the Albatrosses are gentle in their demeanor, this punishment is not carried on in a playful

spirit, but is a thoroughly ruffian-like proceeding. We were all agreed that *nigripes* indulged in it rather more than *immutabilis*, and was likewise more savage. Dr. Gilbert observed a Black-footed Albatross take in a circle of about twenty young *immutabilis* and wool them soundly. Finally, however, the bully arrived at a youngster whose parent, being unexpectedly near by, set upon the persecutor with disastrous effect, and in the ensuing scrimmage put *nigripes* completely to rout. Not a few of the young die as a result of this treatment. I am just now at a loss to suggest an explanation for the prevalence of such heartless behavior.

Near the forms or nests one not infrequently finds solid pellets, disgorged by the Albatrosses, consisting entirely of squid beaks, and the opaque lenses of the eyes. These lenses become very brittle and amber-like under the action of the stomach juices, and show a concentric structure. Candle-nuts, the large seed of *Aleurites molluccana*, were found by Prof. Snyder in the interior of the island and were almost undoubtedly ejected by Albatrosses. As is well known, Albatrosses pick up all sorts of floating material, and candle-nuts are frequently seen on the ocean, having been swept to sea by mountain streams. The nearest trees are on Kauai, about 700 miles east. This suggests a means by which many hard floating seeds might be carried into the interior of islands by albatrosses, shearwaters, petrels, and frigate birds, and thus obtain a foothold, whereas if swept ashore on barren rocks or beaches they would stand little chance of ever germinating.

In large colonies of animals, it has always been something of a problem how a parent is able to find its young among so many of its kind. The voice is probably responsible in some cases, but as birds are extremely keen of sight and evince a positive genius for discriminating landmarks, I believe the Albatrosses must in some way depend upon peculiarities in the surroundings of their young. It is worthy of record, however, that the young often 'sing' in a thin, high squeak, which is kept up continuously for periods, and may be of service in guiding the parent, though I could not distinguish the slightest individuality in tone. I do not know whether they do this when the old birds are present, but remember that very many were engaged in the cricket-like song when we visited a populous colony late one moonlight night.

I frequently saw the young sleeping, their eyes being tightly closed and bill tucked under the wing, the usual bird fashion. At night I was much surprised to walk up to the sleeping youngsters, and see how they slumbered on oblivious to the various distractions of their surroundings — the startled cries of terns, the *Ah-h-h's* of Albatrosses, and caterwauling of shearwaters. The feeling of absolute safety has evidently dulled that characteristic alertness, which we are apt to associate with sleeping wild creatures. I have even succeeded in sitting down beside them, without disturbing their slumber, but when I at last patted their heads they very suddenly came to, and the awakening was highly diverting. They appeared confused for a moment, and would then back off most rapidly, snapping the beak with remarkable speed. The old birds seem to be wide awake at night, but about ten o'clock in the morning they frequently sleep near their young, with the bill and one eye covered by the wing.

Albatrosses are inquisitive creatures, especially on the ocean. Anything unusual will immediately attract them, and on land I have had them come trotting up evidently actuated by some other motive than the search for food. One day the dory, rather overloaded, was making for the beach through a choppy sea. Suddenly a wave curled aboard, and then the boat capsized, leaving the occupants struggling in the water. A Gony at some distance perceived the disturbance, and came flapping in great haste over the waves, hoping perhaps for a tender morsel. It settled near the plumpest member of the party, and swam about on a little tour of inspection. The look of anticipation on the creature's face was so unmistakable, that the carpenter at length became uneasy, and exclaimed, "Can't you wait till I croak."

The Albatrosses live on Laysan nearly ten months of the year. During the last days of October, before the winter storms set in, the first vanguard of the mighty army appears, and for days they continue to flock in from all points of the compass. Dr. H. Schaumsland, who witnessed their advent, says that in exposed places the island becomes literally white with the countless throng, as if great snow-flakes had suddenly descended upon the scene. So vast is the number of birds that many are obliged to be content with rather unsuitable nesting spots, while late-comers must

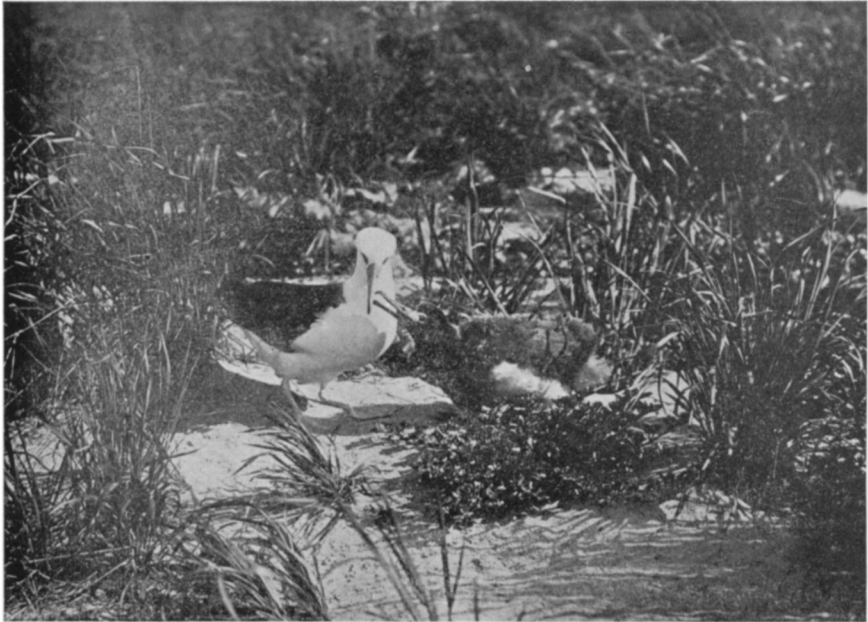


FIG. 1. YOUNG ALBATROSS ASKING FOR FOOD.



FIG. 2. OLD BIRD STARTING TO DISGORGE.



FIG. 1. THE ARRIVAL OF BREAKFAST.



FIG. 2. *DIOMEDEA NIGRIPES* PUNISHING STRANGE YOUNG.

leave the overcrowded area. Loving couples defend their rights against the tardy ones, and it is several days before all have settled their respective claims.

The white Albatross lays one egg, on the ground, usually in a slightly raised mound with a shallow basin in the top. We saw numbers of these 'forms' almost worn out by the young birds. According to Mr. Max Schlemmer, the representative of the guano company, the egg is laid about the middle of November. We were of course out of season to secure any, although we saw numerous spoiled ones half buried in the sand. The ground color is usually dirty white, with irregular patches and spots of brownish maroon at the larger end. Eggs of this type usually average 111.5 mm. in length by 62.5 mm. in width. There is another type, very short and thick (100 mm. by 70), uniform brownish buff without any markings whatever¹. The young are not hatched until February (Schlemmer) and then begin the six months of hard work to feed the hungry babies. They grow slowly, for birds, and it is not till the last of July that the most venturesome follow their parents on short flights to sea. A few weeks later all are on the wing, and with the old birds they scatter far and wide over the Pacific. Then for two months at least they take a vacation, as it were, before undertaking the cares of the next nesting season. They have been found in their wanderings as far away as Myiakejima, Japan, and Guadelupe Island off Lower California. Besides on Laysan, *Diomedea immutabilis* makes its home on Midway, Lisiansky, French Frigate Shoal, Necker and Bird, and *D. nigripes* is likewise found on these islands, but very sparingly on the last two.

After the Albatrosses leave Laysan the broad rookeries are bare, and with the advent of the fall rains a fine grass springs up all over the deserted cities, forming delicate verdure where recently the ground was packed hard by busy feet. The ancestral home is now bereft of its greatest attraction, and surely the face of the island must seem entirely changed.

Mr. Dutcher in a recent article on the Herring Gull well says that not even the most facile pen can describe the life and beauty

¹ I am indebted to Rothschild's 'Avifauna of Laysan,' p. 291, for this description of the eggs.

of a great bird colony. Thus in attempting to indicate something of the life of the Albatross I have wholly failed to include the subtle charm which reaches one through the soft tropical sky, the salty breeze, the sparkling lights on waves, now green now purplish, as they break on the coral reef; and the wilder scenes in the tossing surges that assail the eastern shore with booming roars and clouds of flying spray; and the darting, screaming multitude of sea fowl gleaming their living prey from the tumult of waters, or winging their certain way to the expectant nestlings. Every sight and sound leaves a lasting impression, and yet, perhaps, it will be the *mystery* of those myriads of sentient beings that will linger when all else has been forgotten.

NESTING HABITS OF THE HERODIONES IN FLORIDA.

BY A. C. BENT.

Plates IX and X.

DURING the past two seasons, April and May, 1902 and 1903, I have had excellent opportunities to study the nesting habits of all the species of this order known to nest within the limits of the State of Florida, with the exception of the Glossy Ibises and the Reddish Egret, the former being very rare in the regions visited, and the latter being practically confined to the Florida Keys where it is by no means common. The season of 1902 was spent in Brevard County, at various points along the Indian River from Titusville to Sebastian, and in the interior, among the marshes and cypress swamps of the upper St. Johns River, this latter locality proving most fruitful. The river at this point is spread out over a marshy area about three miles wide with a narrow open channel and a series of small lakes or ponds in the center. Except in these open places the water is very shallow, from one